SPECIFICATION

TITLE OF THE INVENTION

HOME SERVER AND INTERNET SERVICE SYSTEM

5   **BACKGROUND OF THE INVENTION**

The present invention relates to a home server or a home controller, and especially to an apparatus, a system, and a method which can implement an internet-connection having a function for preventing an unjust access to the home server

10   or the home controller.

As examples of information communication devices which access a telephone line by using a modem used mainly in a home, there are PCs (Personal Computers), PDAs (Personal Digital Assistances), and home servers such as a desktop box (hereafter

15   referred to as a home server.) When communicating, such as accessing a telephone line by using a modem, a home server itself calls up the internet service provider in order to connect itself to an internet. Some home servers can respond to a call-up sent from an external telephone.

20   Here, an example of a method of accessing an internet via a telephone line by using a modem is described in pages 41 and 42 of a book "ALL CONCERNING AN INTERNET CAN BE FIGURED OUT BY DIAGRAMMATIC EXPLANATION" by Osamu Koizumi, Nihon Jitugyoh publishing company.

25   In the above conventional techniques, a home server which can respond to a call-up from an external telephone responds to all call-ups. It may give many chances of unjust accesses

to the home server from the outside that the home server responds

to all unspecified telephone-number calls from outside, which

in turn causes security problems. Further, since the home server

cannot be connected to an internet by a remote operation, if

5   it is required to access the home server from the outside via

an internet, it is necessary to connect the home server to

an internet full-time. Thus, this increases the

internet-connection charge (telephone charge), and also causes

a security problem.

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SUMMARY OF THE INVENTION

The present invention is aimed at providing a function

for making it possible that a home server responds to a call-up

from a specific sending source, and for connecting the home

15   server.

To achieve the above objective, the present invention

provides a home server, which receives a requirement sent from

a sending source (a calling-up person or machine) via a

communication line, offers an internet service, and controls

20   equipment connected to a home server in its own home, said

home server comprising: telephone number

coincidence-checking means (a unit for confirming on a

registration of a telephone number corresponding to a telephone

accessing the home server) for determining whether or not it

25   can be accepted to perform a requirement sent via said

communication line; modem means for said requirement, which

has been accepted by said telephone number coincidence-checking

means; protocol-processing means for converting said

requirement; internet service-offering means for offering an

internet service corresponding to said internet

service-requirement converted by said protocol-processing

5 means to said sending source; and control means for controlling

equipment in said home if said internet service-requirement,

which is to be offered by said internet service-offering means,

needs a control process concerning said internet service; and

a service provider which receives said internet service and

10 tries the performing of connection corresponding with the

connection-requirement for said internet service, which has

been required from the sending source.

BRIEF DESCRIPTION OF THE DRAWINGS

15   Fig. 1 is a schematic block diagram showing the composition

of a total system including a home server which can prevent

an unjust access to the home sever from an external network.

Fig. 2 is a schematic block diagram showing the composition

of the home server.

20   Fig. 3 is a schematic block diagram showing the composition

of a unit for checking on registration of a telephone number

corresponding to a telephone accessing the home server.

Fig. 4 is a flow chart of processing performed by the

unit for checking on registration of a telephone number

25 corresponding to a telephone accessing the home server.

Fig. 5 is a schematic block diagram showing the composition

of a total system using an internet-connection call service

unit.

Fig. 6 is a schematic block diagram showing the composition of the internet-connection call service unit.

Fig. 7 is a flow chart of processing performed by the internet-connection call service unit.

Fig. 8 is a schematic block diagram showing the whole composition of another system using an internet-connection call service unit.

Fig. 9 is a flow chart of an operation performed by the home server, for connecting a telephone requiring connection to an internet service provider.

Fig. 10 is a list of telephone-mail address combinations.

Fig. 11 is a schematic block diagram showing the whole composition of a home system including controllers each of which prevents an unjust access to the home server from an external network.

Fig. 12 is a schematic block diagram showing the composition of each controller.

Fig. 13 is a schematic block diagram showing the composition of each controller.

Fig. 14 is a table used by a service task-authentication program.

Fig. 15 is a schematic block diagram showing the functional composition of a business model using the internet-connection call service unit.

Fig. 16 is a schematic block diagram showing the control, which is performed for the home server, of connecting telephone

lines connected to the public telephone network.

DETAILED DESCRIPTION OF THE DRAWINGS

Hereafter, details of the embodiments will be explained
5   with references to Fig. 1 - Fig. 16.

Embodiment 1:

Fig. 1 shows the composition of a fundamental system
to which the present invention is applied.

PC 60 is connected to a public telephone network via
10 a telephone line 401. A home server 1 in a home 51 includes
a unit 101 for checking on registration of a telephone number
corresponding to a telephone accessing the home server 1
(telephone number coincidence-checking means.) The home
server 1 is connected to the public telephone network 400 via
15 a telephone line 40. Further, a FAX telephone 311 is connected
to the public telephone network 400 via the home server 1 by
using a telephone line 4001.

As the server 1, a gateway device in a home, a home controller,
a desktop box, etc., can be assumed.

20   The device 60 is not restricted to a personal computer,
and will be a device which includes a modem, or with which
a modem can be used. Further, a PDA (Personal Digital Assistant)
and a portable telephone can also be used as the device 60.
The telephone lines 40 and 4001 can be implemented by any one
25 of radio communication and fixed-line communication. The
device 311 can possess only a time-shift function, or along
with a facsimile function. Further, the home 51 can be any

one of a detached house, a housing complex, a facility, or an apparatus installed in the open air, such as a vending machine.

In the following, the fundamental operations of this system of the embodiment will be explained mainly with reference to Fig. 1. The PC 60 tries a connection to the home server 1 by calling-up to the telephone number of the home 51 via the route of the telephone line 40, the public telephone network 400, and the telephone line 40. The unit 101 for checking on registration of a telephone number checks whether or not the telephone number of the PC 60, which is currently accessing the home server 1, coincides with one of the registered telephone numbers, and if any registered telephone number does not coincide with the telephone number of the PC 60, the unit 101 for checking on registration of a telephone number does not respond to the call-up. Conversely, one of the registered telephone numbers coincides with the telephone number of the PC 60, the unit 101 responds to the call-up after the FAX telephone 311 responds to the call-up. Further, if the call-up indicates connection to a modem in the home server 1, the unit 101 starts the connection to the modem, and disconnects the connection to the FAX telephone 311. Conversely, if the call-up does not indicate connection to the modem in the home server 1, the unit 101 disconnects the connection to the unit 101 itself. As described above, the home server 1 can be connected to the modem only if the telephone number of the PC 60 coincides with one of the telephone numbers which have been registered in the home server 1, and the call-up from the PC 60 indicates connection to the modem.

Fig. 2 schematically shows the composition of the home server 1. The home server 1 includes the unit 101 for checking on registration of a telephone number corresponding to a telephone accessing the home server 1, the modem 102, and a central part 10 of the home server 1. Meanwhile, in this figure, since the modem 102 is shown as a typical modem having a conventional main function, the modem 102 is shown separately from the unit 101 for checking on a registration of a telephone. However, it is possible to incorporate the unit 100 function into the modem 102.

Fig. 3 schematically shows the composition of the unit 101 for checking on registration of a telephone number. A unit 10100 for controlling connection of the home server 1 to telephone lines, controls the connection among the telephone line 40 and 4001, and the modem 102. A unit 10101 for retrieving telephone numbers, compares the telephone number of the sending source with a list of the telephone numbers which have been registered in a database 1011 for registering telephone numbers, which is used to check whether or not the telephone number of the sending source coincides with one of the telephone numbers registered in the list when the home server 1 is called up via the public telephone network 400. A signal-determining unit 10102 determines whether or not the contents of the call-up indicates a requirement of connection to the modem 102 (modem-connection requirement for data transmission, performed by the PC).

Meanwhile, the telephone lines 40 and 4001 are connected

to the public telephone network 400 and the FAX telephone 311, respectively. Further, the telephone lines 40 and 4001 are connected to each other in the unit 10100 which controls the home server 1 so as to be connected telephone lines under default

5   conditions.

Operations of the unit 101 for checking on registration of a telephone number corresponding to a telephone accessing the home server 1 are explained below with reference to a flow chart shown in Fig. 4. In step 9015, the unit 10101 for retrieving

10 telephone numbers compares the telephone number of the sending source with the list of the telephone numbers which have been registered in the data base 1011 for registering telephone numbers in order to check whether or not the telephone number of the sending source coincides with one of the telephone numbers

15 recorded in the list, in response to the call-up transmitted via the public telephone network 400. If it is found that the telephone number of the sending source coincides with one of the registered telephone number, in step 9010, the unit 101 checks whether or not a FAX-telephone mode has been set to

20 the home server mode. If the FAX-telephone mode is set to the home server mode, in step 9011, the unit 101 responds to the call-up after the unit 101 waits until the FAX telephone 311 starts responding to the call-up and becomes into a talking state, and the home server 1 also responds to the call-up.

25 Otherwise, in step 9012, the unit 101 waits for a predetermined period, and responds to the call-up if there is no response from any other telephone. Next, in step 9013, the

signal-determining unit 10102 determines whether or not the contents of the signal transmitted from the sending source indicates a requirement of connection of the home server 1 to the modem 102. If it is determined that the contents of

5 the signal transmitted from the sending source indicates a requirement of connecting the home server 1 to the modem 102, in step 9016, the connection of the home server 1 to the modem 102 is started, and the connection of the FAX telephone 311 to the telephone line 40 is simultaneously disconnected by

10 interrupting the connection between the telephone lines 40 and 4001 in step 9014. Conversely, if it is determined that the contents of the signal transmitted from the sending source do not indicate a requirement of connecting the home server 1 to the modem 102, the unit 101 does not perform the connection

15 operation to the modem 102 in step 9017. Meanwhile, in step 9015, if it is determined that the telephone number of the sending source does not coincide with any one of the registered telephone number, the unit 101 does not respond to the call-up transmitted from the sending source in step 9018.

20 In the operation in step 9017, the telephone response of the home server1 is stopped, or will be stopped after the calling to the FAX telephone 311 is finished.

Meanwhile, the unit 10100 for controlling connection of the home server 1 to telephone lines, which is situated

25 in the unit 101, can be implemented by using a circuit which switches connections among the telephone lines, and a control logic circuit. Also, a part or the whole of the control logic

circuit can also be implemented using a control software program performed by a microcomputer. Further, the unit 10101 for retrieving telephone numbers can also be implemented using a telephone number-display function used by a telephone in

5   which a telephone number-display service is provided by NTT (Nippon Telegraph & Telephone Corporation) is available, and a comparator for comparing a telephone number of a sending source with telephone numbers recorded in the list which has been registered in the data base 1011 for registering telephone

10 numbers. The function of the comparator can also be implemented using a control software program performed by a microcomputer. Moreover, the signal-determining unit 10101 can be implemented by making use of a circuit portion for recognizing a signal, which is included in the modem 102.

15   With reference to Fig. 16, the composition and operation of the controlling device 10100 for connecting telephone lines. The controlling device 10100 is connected to the telephone lines 40 and 4001, the unit 10101 for retrieving telephone numbers, the signal-determination 10102, and the modem 102.

20 Further, a switch 101001, a switch 101002, and a BELL-calling unit 101003 are connected to the telephone line 40. The switch 101001 is a switch for connecting the telephone line 40 to either the telephone line 4001 or the modem 102. In the default state, the telephone line 40 is connected to the telephone

25 line 4001. On the other hand, the switch 101002 is a switch for connecting the telephone line 40 to a telephone number receiving module 101004, and in the default state, the telephone

line 40 is disconnected from the telephone number receiving
module 101004.

When a call-up is sent from a sending source to this
home server, the BELL-calling unit 101003 detects the call-up,
and turns on the switch 101002. The telephone number receiving
module 101004 takes in the telephone number of the sending
source, and sends the taken-in telephone number to the unit
10101 for retrieving telephone numbers. The unit 10101 for
retrieving telephone numbers compares the telephone number
of the sending source with the registered telephone numbers
in the data base 1011. The result of the comparison is informed
to the coincidence checking device 101006. If the telephone
number of the sending source coincides with any one of the
registered telephone number, the coincidence checking device
101006 connects the call-up to the signal-determination unit
10102, and it is determined whether or not the contents of
the call-up is a modem-connection requirement for data
transmission, for example, by a PC. Conversely, if the
coincidence checking device 101006 determines that the
telephone number is not registered, the switch 101002 is turned
off. The determination results of the signal-determination
unit 10102 is processed at the processor 101008. If the call-up
sent from the sending source is a modem-connection requirement
for data transmission, the processor 101008 switches the
connection of the switch 101001 to the connection between the
telephone line 40 and the modem 102. Otherwise, the processor
101008 disconnects the telephone line 40 from the telephone

number receiving module 101004.

The present invention is effective for preventing unjust connection from the outside of the home server 1, which in turn improves the security of the home server 1, by the

5 connection-control function of the home server 1, in which a connection of the home server 1 to only a telephone whose number is registered in advance, is permitted. Further, since only a requirement of connecting the home server 1 to the modem 102, which is sent from a telephone other than telephones whose

10 numbers are registered in advance, is not accepted, operation requirements of other devices connected to the home server 1, such as the FAX telephone, are not hindered. Meanwhile, since a telephone number is not set in the telephone but in a switchboard to which a telephone is connected, it is very

15 difficult to tamper with a telephone. Accordingly, using a telephone for authentication is an effective measure which improves the security of the home server 1, because it is assured that the switchboard is connected to a telephone line by which the telephone of the sending source is connected to the

20 switchboard.

In this embodiment, although the FAX telephone 311 is connected to the telephone line 4001 connected to the home server 1, it is possible to connect the FAX telephone 311 to a telephone line installed in the home 51, situated in parallel

25 to the telephone line 40. Also, if the FAX telephone 311 includes a FAX signal-determining means (determining of modem signals) which is the same signal-determining means of the unit 10102,

it brings the same effects as those obtained by the above embodiment.

Meanwhile, in this embodiment, the analog type modem 102 is connected to the analog telephone-lines. However, the 5 present invention can also be applied to a system in which a digital type transmission line such as ISDN is used.

Embodiment 2:

Fig. 5 schematically shows the composition of a system 10 to which the present invention is applied.

A PC 62 in an office 52 is connected to an internet 410. The portable telephone 61 is connected to the internet 410 via a portable telephone network 43 and an internet-connection center 70 of the portable telephone 61. Further, the home server 15 1 in the home 51 is connected to an internet-connection service provider 71 via the telephone line 40 and the public telephone network 400. This service provider 71, which is connected to the internet 400, includes an internet-connection call service unit 7101.

20 The portable telephone 61 is a telephone having an internet-connection function, for example, an i-mode type portable telephone.

Fig. 6 schematically shows the composition of the internet-connection call service unit 7101. A DB (Data 25 Base)-retrieval unit 10101 compares registered information with the connection requirement sent from the sending source via the internet 410. The authentication unit 71013 performs

an authentication to the sending source (for example, PC62 or portable telephone in the figure), which has requested the connection requirement 71010. The internet-connection call unit 71014 connects the call from the sending source to a telephone

5   whose number has been registered in the DB 71012 storing a list of telephone number-registrant pairs.

The connection requirement 71010 corresponds, for example, to URL (Uniform Resource Locator), that is: http:// home page of service provider / a name of a registered user/ .

10   The authentication unit 71013 executes the authentication processing by using a pair of an input LOGIN name and an input pass word, or only an input pass word.

The internet-connection call service 7101 is explained below with reference to a flow chart shown in Fig. 7. In step

15   9020, the DB retrieval unit 10101 confirms whether or not the connection-requiring user (sending source) is registered, by comparing the telephone number of the sending source with the telephone number registered in the DB 701012. If the telephone number of the sending source is not registered, the internet

20   service provider do ordinary processing in step 9024. Conversely, if the telephone number of the sending source is registered, in step 9021, the authentication unit 7103 executes authentication processing to the sending resource in step 9021. Further, if the sending resource passes the authentication,

25   in step 9022, the internet-connection call unit 71014 connects the connection-requirement user to a telephone number registered in the DB 701012 which includes a list of telephone

number - registrant pairs. Conversely, if the sending resource does not pass the authentication, the connection-requirement 71010 is refused.

As described above, the connection between the internet-connection service provider 71 and the home server 1 in the home 51 has become possible. Further, if a terminal device can be connected to an internet, the terminal device can be connected to the home server 1 from anyplace. Therefore, it is not necessary to always connect the home server 1 to an internet, which in turn can reduce a telephone line-using fee or an internet-connection service charge. Furthermore, it has become possible to reduce unjust accesses from the outside, because continuous connection of the home server 1 to an internet becomes unnecessary.

In addition, if the access target of the connection-requirement is the home server 1 in step 9022, it is possible to prevent an unjust access required from the outside and improve the security of the home server 1, by connecting only a telephone, whose number is registered, to the home server 1, and not connecting a telephone, whose number is not registered, to the home server 1.

Even if the internet-connection call service 7101 does not include the authentication unit 71013, the service from the internet-connection service provider 71 to the home server 1 in the home 51 is possible. However, all PC sources which know the registered members can try to access the home server 1 via an internet to which the home server 1 is connected.

This causes the deterioration in the security of the home server 1, and frequent connection to the home server 1.

Fig. 15 shows a business model using the embodiment shown in Fig. 5, in which the service provider offers an internet-connection call service. The service provider 71 offers the internet-connection service 7101, and tolls (service charge 7102 + consumed telephone fee 7104) from the user 50. Further, the service provider receives telephone line use services 7103 from a telephone company 401, which are used for telephone connection services to the home server 1, and pays the service charge to the telephone company 400 in the telephone charge 7104. The collection method of service charge 7102 is performed, for example, by determining a connection service charge for one time in advance, and automatically calculating total service charge based on times of services offered in a month. Or, it is possible that one month service charge is fixed to a constant charge. Moreover, is also possible that the basic service charge is constant within predetermined service times, and if the times of services exceed the predetermined service times, the charge proportional to the excess service times from the predetermined service times is added to the basic service charge. Furthermore, the service provider creates a bill for each user every month, indicates it to him, and collect the service charge of each user. Moreover, the charge in each month is recorded.

Meanwhile, in the pay flow of the telephone fee, it is possible that the user 50 directly pay the fee to the telephone

company not through the service provider 71.

Also, the telephone company 400 can execute a business of communication connection services. Moreover, the user 50 is not restricted to an individual, and the user 50 can be

5 a legal entity.

Fig. 8 shows an application example of the embodiment shown in Fig. 5.

The PC 60 is connected to the internet 410 via the access point 1 (711) in the route of the telephone line 401, the public

10 telephone network 400, and the internet service provider. The home server 1 in the home 51 is connected to the access point 2 (710) via the telephone line 40, and the public telephone network 400. This access point 710 is connected to the internet 410, and includes an internet-connection call service unit

15 7101.

In the composition shown in Fig. 8, a connection-requirement 71010 (Fig. 6) to the internet-connection call service 710 via the internet 410 is restricted to a connection-requirement sent from the access

20 point which is controlled by this service provider. This restriction can be implemented by confirming IP(Internet Protocol address) of the sending source. By this restriction function, it has become easy to prevent an unjust access to the home server 1 from the outside of the control area managed

25 by this service provider, which in turn can improve the security of the home server 1.

Embodiment 3:

Fig. 9 shows a flow chart of internet-connection procedures in which the home server 1 is connected to a conventional internet service provider without the

5 internet-connection call service unit 7101, which has been explained in the previous embodiment.

In the system composed in the embodiment, which is shown in Fig. 1, at first, in step 9031, the PC 60 tries an access to the home server 1 by calling-up the telephone number of

10 the home 51 via the telephone line 40, the public telephone network 400, and the telephone line 40. Further, it is checked whether or not the telephone number of PC 60 coincides with any telephone number registered by the unit 101 for checking on registration of telephone number corresponding to telephone

15 accessing the home server 1. If the coincidence is confirmed, in step 9032, the home server 1 advises the sending sources that a coincidence test has passed, and interrupts the connection to the sending source once. Consequently, in step 9034, the home server 1 connects to the internet service provider (ISP)

20 by means of dial-up internet protocol (IP) connection. When the internet protocol (IP) connection is executed, in step 9035, the IP address allocated by the internet service provider is sent to the e-mail address of the sending source by e-mail, which is registered in the home server 1. Meanwhile, in step

25 9031, if the telephone number of the sending source does not pass the coincidence test, the home server 1 does not respond to the call-up sent from the PC 60.

Selection of the e-mail address in step 9035 is possible by providing a list of telephone number of sending source – e-mail address pair, such as that shown in Fig. 10, in the home server 1.

5   Also, in step 9031, it is possible that the home server 1 does not use the unit 101 for checking on registration of a telephone number corresponding to the telephone accessing the home server 1, and alternatively, it is possible to check a password sent from PC.

10

Embodiment 4:

Fig. 11 shows an application example of the home server 1 and its system composition. A controller 110 is an application example of the home sever 1, and is connected to the public

15   telephone network via the telephone line 40. Also, the controller 110 is connected to the FAX telephone 311 via the telephone line 4001. Various kinds of I/O devices 301 – 30M (M is a positive integer) are connected to the controller 110. The controller 110 is further connected to the network 41,

20   and the network are also other controllers 1101 – 110P (P is a positive integer). Further, the controller group 1101 – 110P can communicate with the controller 110. Furthermore, the controllers 110, and 1101 – 110P are connected to various kinds of net devices by a wireless network.

25   In this embodiment, the I/O devices such as infrared ray send/receive devices 301 and 3011 are connected to the controllers 110 and 110p. Moreover, infrared ray

device-mounting components 321 – 32Q (Q is a positive integer)

are connected to each other by an infrared ray signal 43 network.

Also, infrared ray device-mounting components 3211 – 321R (R

is a positive integer) are also connected to each other by

5   an infrared ray signal 44 network. In addition, operations

of respective group of the infrared send/receive components

are controlled by a corresponding controller 110 or 110P.

Further, in this embodiment, the controller 1102 is

incorporated into the household electrical appliance 1112.

10   The I/O devices 301 – 30M (M is a positive integer),

such as an infrared ray sending device, an infrared ray receive

device, a thermometer, a humidity indicator, a speaker, a

microphone, an inverter, a household electrical appliance,

etc. are to be controlled or monitored.

15   The network devices 1111 – 111S (S is a positive integer)

are, for example, PDA (Personal Digital Assistances), a portable

telephone, a network household electrical appliance, and so

on.

The network 41 can be created by a network using telephone

20   lines as typified by Ethernet or HomePNA, or a network using

lighting lines as typified by HomePlug. The wireless network

42 can also be implemented by Bluetooth, Home RF, IEEE 802.11,

etc.

In the system composition shown in Fig. 11, various kinds

25   of components in the home 51 can be controlled by control

instructions input from the outside via the telephone line

40. On the other hand, information on operations of the

components in the home 11 can be transmitted to external terminals via the telephone line 40.

Fig. 11 shows the composition of the controller 110. The controller 110 includes the unit 101 for checking on registration of a telephone number corresponding to a telephone accessing the home server 1, the modem 102, and the central part 10 of the controller.

The telephone lines 40 and 401 are connected to the unit 101 for checking on registration of a telephone number corresponding to a telephone accessing the home server 1, and the LANs 41 and 42 are connected to the LAN controllers 1021 and 1022. Further, the I/O devices 301 and 30M (M is a positive integer) are connected to the I/O resource 105. The central part 10 includes a CPU core 103, an OS kernel 104, the I/O resource 105 such as a digital input/output device, an analog input/output device, a serial port typified by RS-232C, etc., LAN controllers 1021 and 1022, and various kinds of program groups which are executed by the CPU core 103.

Various kinds of program groups includes a modem driver 201, a PPP (Point-to-Point Protocol) 202, a PPP authentication program 2021, a TCP (Transmission control program) / IP (Internet Protocol), an application program-authentication program 205, application programs 2041 - 204L (L is a positive integer), a service task-authentication program 206, various types of service tasks 2071 - 207N, and 2081 - 208k (N and K are positive integers), protocol stacks 2031 and 2032, and LAN drivers 2011 and 2012.

In this example shown in this figure, a WEB server 2041, a mail-sending program 2042, an application-control program 2043, a program 204L for monitoring application programs, are loaded. The service tasks 2071 - 207n perform the processing

5   of input information to and output information from the various kinds of devices connected to the I/O resource 5. The service tasks 2081 - 208K monitor and control the units connected to the LANs 41 and 42. Further, the service task 2081 monitors and controls units connected to the LAN 41 via the protocol

10 stacks 2031 and the LAN driver 2011. Further, the service task 208K monitors and controls units connected to the LAN 42 via the protocol stack 2032 and the LAN driver 2012 (for example, the ON/OFF controlling, or operation states of household electric appliances connected to LAN 42 shown in Fig. 1.)

15 Meanwhile, the protocol stack 2031 is a TCP/IP stack.

The PPP authentication unit 2021 is an authentication service-implementing program using a LOGIN name and a pass word, and a user using the a remote terminal, who intends to access the controller 110 via the telephone line 40, cannot

20 access the controller 110 if the sending source (the user) is not permitted by the authentication program. Further, the application program-authentication program 205 executes the authentication of performing each application program, and only an application program permitted by the application

25 program-authentication program 205 can be performed. The service task-authentication program 206 executes the authentication of performing each of the service tasks 2071

- 207N, and 2081 - 208K, and only a service task permitted by the service task-authentication program 206 can be executed.

Fig, 14 shows an example of the table used by the service task-authentication program 206. In the table, for each service

5   task, access permitted groups, and priority level of each permitted task, are listed up. Moreover, a class level of each service task group and its priority level are allocated to each user ID. If a service task which a user intends to use exists in the allocated class of service task group, the user

10   can use the service task. Otherwise, if the priority level of the wanted service task is lower than the currently permitted priority level, the wanted service task can be used. (Meanwhile, in this embodiment, a low level number indicates a high priority.) A sending source other than the above permitted users cannot

15   receive any service provided in the home 51. Moreover, the service task-authentication program 206 can be implemented by using only the class level of each service task group, or using only priority level of each service task.

A method of the application program-authentication 205

20   is similar to that of the service task-authentication 206. That is, the application program-authentication 205 executes the authentication function by using the class level of each application group and its priority level of each application program.

25   As described above, since four authentication stages of checking on registration of the telephone number of the sending source, the PPP authentication, the application

program-authentication, and the task service-authentication, are provided in the controller 110, an unjust access to the home server 1 from the outside can be prevented, which in turn can compose a network system in a home, whose security is

5   remarkably improved.

Meanwhile, it is possible to compose a network system without one or more authentication functions in the above four functions.

Further, although the two kinds of the LANs 41 and 42

10   are connected to the controller 110 in Fig. 12, one or both of the LANs can be removed. Naturally, LANs connected to the controller are not restricted to the two kinds of LAN 41 and LAN 42, and it is possible to connect more than two kinds

Fig. 13 shows the composition of the controller 1101.

15   This composition is a typical example of the controllers 1101, 1102, ... 110P. The controller 1101 is composed; by removing the unit 101 for checking on registration of a telephone number corresponding to a telephone accessing the home server 1, the modem 102, the PPP 202, the PPP-authentication program 2021,

20   from the composition of the controller 110, and by adding the LAN controller 1020, and the LAN driver 2010. The controller 1101 can prevent an unjust access to the resource in the controller by using two stage authentication services performed by application program-authentication program and the service

25   task-authentication program, and this makes it possible to compose a network system for a home, which has a greatly improved security.

In accordance with the present invention, since the unit 101, which is included in the home server 1, for checking on registration of a telephone number corresponding a telephone accessing to the home server 1 connects a call-up of only a registered telephone number an unjust connection to the home server 1 from the outside can be prevented, the security of the home server 1 can be greatly improved.

Furthermore, only at a necessary time, it has become possible to connect a dial-up IP to the home server 1 from the internet-connection service provider 71. Therefore, it is not necessary to always connect the home server 1 to an internet-connection service provider, which in turn can reduce the telephone line-using fee and the internet-connection service charge. In addition, this can remarkably reduce the higher probability of that unjust accesses to the home server 1 from the outside due to continuous connection to the internet-connection provider.